

Improvement in TWRf and Its Impact on Tropical Cyclones Predictions over the Western North Pacific

*Der-Song Chen¹, Ling-Feng Hsiao², Tien-Chiang Yeh¹

1. Central Weather Bureau, Taiwan, 2. Taiwan Typhoon and Flood Research Institute, Taipei, Taiwan

With violent wind and severe rainfall, the tropical cyclone is one of the most disastrous weather system over ocean and the coastal area. To provide accurate tropical cyclone track and intensity forecasts is one of the most important task of the national weather service of countries affected. Taiwan is one of the area frequently influenced by tropical cyclones. Improving the tropical cyclone forecast is the highest priority task of Taiwan's Central Weather Bureau (CWB).

Recent improvement of the tropical cyclone forecast is due to the improvement of the numerical weather prediction. A version of the Advanced Research Weather Research and Forecasting Model (ARW WRF), named TWRf (Typhoon WRF), was developed and implemented in CWB for operational tropical cyclones forecasting from 2011. During the years, partial update cycling, cyclone bogus scheme, relocation scheme, 3DVAR with outer loop, field blending scheme, new trigger Kain-Fritsch cumulus scheme, and so on have been studied and applied in TWRf (Hsiao et al. 2010, 2012, 2015) to improve the model. The averaged 24/48/72 hours cyclone track forecast errors of TWRf are 91/152/210, 91/147/223, and 84/133/197km in year 2013, 2014, and 2015 respectively.

In this study, we try to improve the model by changing the TWRf configuration from a triple nested to a double nested one, and increasing the model resolution from 45/15/5 km, 45-levels (here TWRFd5) to 15/3 km, 52-levels (here TWRFd3). Results of the track, intensity, and rainfall predictions from both TWRFd5 and TWRFd3 for tropical cyclones over the Western North Pacific Ocean in 2016 are analyzed and compared. The quantitative rainfall predictions over high terrain area are also studied. The preliminary results show increasing the model resolution improving the track, intensity and rainfall forecast. However, the 3 km resolution model TWRFd3 has a tendency to over predict the intensity of the tropical cyclones. The detail will be presented in the conference.

Keywords: tropical cyclone forecast, Typhoon WRF, rainfall predictions